

# TNC/ABI VEGETATION MAPPING PROGRAM

## *Vegetation Classification of Fire Island National Seashore and William Floyd Estate*

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**FINAL DRAFT**

by

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## **INTRODUCTION**

A detailed description and map of the vegetation of Fire Island National Seashore and the William Floyd Estate was developed using the National Vegetation Classification System developed by The Nature Conservancy and the Association for Biological Information in conjunction with the Federal Geographic Data Committee and the Ecological Society of America Vegetation Subcommittee. The final product, a 1:12,000 scale map with descriptions of the component types and all relating metadata files, provides vegetation information in a format that can be useful for the various operations of the National Park Service, including natural resource managers, planners, acquisition specialists and biologists. The product was also developed to provide the natural resource managers with baseline information about the site. Reasonably current information exists about the flora of the park (e.g. Dowhan and Rozsa 1989), and on vegetation (Stalter, Lamont and Northrup 1986), as well as selected vegetation types (Art 1987a, art 1987b) but a more comprehensive and current map and description of the park's vegetation based on a standard national classification scheme were needed. Information on community composition and rarity can help to inform decisions on management of particular areas and natural communities within the park. Such information is critical to ensure the persistence of the native plant and animal species in the park in light of human use, invasion of non-native plant species, deer browse, and other disturbances to the habitats.

The Nature Conservancy, in partnership with the network of Natural Heritage Programs, developed a classification of vegetation of the United States (Grossman et al. 1998). This system has been adopted by the Federal Geographic Data Committee and the Ecological Society of America Vegetation Subcommittee as the national vegetation mapping standard, the National Vegetation Classification System (NVCS). Although the two systems (Grossman et al. 1988 and the NVCS) are nearly identical, The Nature Conservancy continued to refine the classification through an active review process with the state Natural Heritage Programs and academic professionals. The responsibility of the NVCS, including review and revision, is now under jurisdiction of the Association for Biodiversity Information (ABI, Arlington VA). Portions of the classification are now available on-line at [www.natureserve.org](http://www.natureserve.org) (NatureServe, 2001).

The basic unit of the classification system, the association, is roughly equivalent in scale to the plant association of European phytosociologists. The association is a unit of vegetation that is more or less homogeneous in composition and structure and occurs on uniform habitat. Above this level in the classification is the alliance, a group of associations sharing one or more dominant or characteristic species. Alliances are generally more wide-ranging geographically than are associations, although many monotypic alliances have been classified. Where the component associations of an alliance have not been classified, an association is assigned the same name as the alliance and noted as "placeholder".

Although associations are defined by the plants that comprise them, they are in fact communities of all the component organisms of that association, including animals, protozoans, bacteria, and fungi. Associations are classified from a national perspective,

and are assigned global rarity ranks as well as ranking specifications to be applied to individual occurrences of associations across their range. A map of associations occurring at a site can provide information about the abundance and distribution of each type, the significance of the individual occurrences, and also provides surrogate information about the location and abundance of individual species characteristic of the association.

In accordance with the standards for this national mapping effort, the vegetation of Fire Island National Seashore was mapped to the association level using a 0.5 hectare minimum mapping unit on 1:12000 color-infrared stereo photography.

## **METHODS**

### **Planning**

Field work follows the methodology developed by The Nature Conservancy in conjunction with the NBS/NPS Vegetation Mapping Program (The Nature Conservancy 1994). The following is a summary of these methods as applied to Fire Island National Seashore.

Fire Island National Seashore is considered to be of “medium size”, one in which decisions regarding number of plots and plot placement by environmental stratification are based on the whole park (by comparison, in large parks, the plot placement and stratification is focused on only a section of the park, and results extrapolated to the whole).

A preliminary list of associations that were known or suspected to occur in the northern Atlantic Coast was generated from the Biological Conservation Database (BCD). This classification was used during a reconnaissance visit by photointerpreters and ecologists to match aerial photo signatures with vegetation on the ground. Preliminary names were assigned to these types and their aerial photo signatures were noted. Extensively disturbed areas and developed areas were assigned labels that describe the predominant landscape feature, e.g., “mown field”, “built up areas”, etc.

### **Field Methods**

Ecologists of the New York Natural Heritage Program developed a vegetation plot sampling design in spring 2000, following USGS/NPS Vegetation Mapping Program guidelines. Aerial photographs, the draft classification, and existing data from the New York Natural Heritage databases were used to choose plot locations. Plots were allocated to each vegetation type that was known from the park and replicate plots were assigned over the geographic range of the type as a surrogate for environmental variation. Additional plots were taken where the vegetation type documented in the field was unclassified or less well known.

Plot sizes ranged from 20 x 20 m for forests and woodlands, 10 x 10 m for shrublands, and 5 x 5 m for herbaceous vegetation. In some cases, where the polygons were too narrow to reasonably accommodate standard plot sizes, the plots were adjusted

accordingly, e.g., 10 x 20 m plots could be used in sampling narrow bands of salt marsh in the park. The vegetation was visually divided into strata, and all the species of each stratum were listed and percent cover estimated. Additional species within the vegetation unit or polygon that occurred outside of sampled plots were listed separately. Species that were not identifiable in the field were collected for later identification. In addition to floristic information, the following environmental information was recorded on field forms: soil profile description, flooding regime, soil moisture regime, slope, aspect and evidence of disturbance. Latitude and longitude of each plot was recorded using a GPS unit. The vegetation profile in cross-section was sketched by hand to represent the location and setting of the plot.

The New York Heritage Program completed sampling of 60 plots on Fire Island and on the William Floyd Estate in the field season of 2000. Twenty-three associations were identified as a result of the analysis. A complete copy of original and transcribed field data sheets was sent to the Association for Biodiversity Information in Boston MA and to the TNC ecologist.

### **Data Analysis**

Park plot data (60 plots) were entered by TNC into The Nature Conservancy's PLOTS Database System (1997) on a Microsoft Access platform. Species were assigned standardized codes and names based on the PLANTS database developed by National Resources Conservation Service (NRCS) in cooperation with the Biota of North America Program (BONAP). Species and plot data for use in ordination and classification were formatted into an Excel for use in the PC-ORD version 4.0 Multivariate Analysis package (McCune and Mefford 1999). TNC Community Ecologist Julie Lundgren did preliminary analyses of the data using Detrended Correspondence Analysis/DCA (Hill and Gauch 1980), Two-Way Indicator Species Analysis/TWINSPAN (Hill 1979) and Non-metric Multidimensional Scaling/NMS (Kruskal and Wish 1978, Clarke 1993). DCA ordinales both species and samples simultaneously along preceived gradients (e.g. that may indicate moisture gradient, elevation, etc.). TWINSPAN successively divides the plots into groups that are similar in species composition. NMS is an ordination well suited to non-heterogenous, non-normal data sets. The initial runs were compared with the draft list of possible alliances in Fire Island National Seashore (Association for Biodiversity Information 2000). The results were reviewed and further analyses with PC-ORD were conducted to assign types to alliances (existing or new).

The results were compared with the National Vegetation Classification subset (ABI 2000). Environmental data on soil characteristics, flooding regime, salinity and topography for each plot were used to interpret the results. The soil survey, topographic maps and polygon locations as delineated on the air photos were also used in the interpretation. Plots were matched to existing associations, and these data were used to further describe the associations at a range-wide as well as park-specific scale.

Copies of the Fire Island data in PLOTS database (in MS ACCESS format) and the PC-ORD formatted data (as a MS EXCEL spreadsheet) was provided to ABI and TNC.

## RESULTS

Initial analyses in TWINSpan identified 5 broadly defined vegetation groups: salt marshes, dune grasslands, dune shrublands, interdunal swales, and forests / shrublands. Further analysis of data subsets indicated a total of 23 different types. Five of the vegetated communities at Fire Island National Seashore are classified as forest types ("Forest Class" in the national vegetation classification hierarchy), one as Woodland, seven as Shrubland, nine as Herbaceous and one as Sparse Vegetation. All but one type was matched to existing associations in the National Vegetation Classification.

The vegetation of Fire Island National Seashore is largely in natural condition and assignment to existing associations was fairly straightforward in most cases. Interdunal swales are quite variable in composition and will require further rangewide analysis of data to be more confident of their assignment. Our approach was to treat them as two groups based largely on salinity as expressed in the presence or absence of halophytic species. However, within the freshwater swales, two or more types may be recognized in future classification efforts.

The vegetation of the William Floyd Estate has been severely altered by human activities and deer browse. As a result, the composition often did not clearly match the global expression of a given alliance or association. Indicators such as infrequent native species or position on the landscape often provided the key to plot assignment. This was particularly problematic in identifying the placement of a sub-set of oak-dominated plots where deer browse and past land use has severely reduced the herbaceous and shrub components. All of the forest on the estate except that dominated by eastern red-cedar or the narrow strip adjacent to the bay were assigned to the *Quercus coccinea* – *Quercus velutina* – *Sassafras albidum* / *Vaccinium pallidum* Forest Association (Coastal – oak – heath community). The abundance of *Carya* species (hickory) and absence of heaths in much of the estate suggested an alternative type in the *Quercus alba* – (*Quercus rubra*, *Carya* spp.) Forest Alliance (oak – hickory alliance), however the absence of indicators such as *Quercus rubra*, *Viburnum acerifolium*, *Cornus florida*, and several species of herbs that are indicative of slightly more mesic and/or slightly richer soils made assignment of this type problematic.

Detailed vegetation descriptions follow which include rangewide and local vegetation description, geographic range, environmental description, most abundant species, characteristic species, conservation rank (global rarity rank), confidence level of classification and references. Conservation rank is on a scale from G1 to G5 with G1 being globally rare, and G5 being widespread and common. Confidence level of classification was rated on a scale of 1 to 3, with 1 being the highest level of confidence. New types that were undocumented in the literature or where data was sparse were given the lowest confidence rank of 3, indicating that they are classified at the alliance level only, pending further regional classification work.

All plot locations for this project have been transferred to the base map in GIS. The classification of each plot will be compared to the mapped unit to determine where

discrepancies occur. The map will then be further checked in the field to correct any known errors. In addition, although we have high confidence in the accuracy of the information collected and in the map in general, a methodical accuracy assessment will be conducted in 2001 by Virginia Tech. Further edits of the GIS data layers may be made following that process.

## **DISCUSSION**

Fire Island National Seashore is located on the North Atlantic Coast ecological region. The vegetation is closely aligned with vegetation types described along the coast from Cape Henlopen, Delaware to central Maine. The surficial sediments are of glacial origin.

The fields on the William Floyd estate are periodically mowed. Some are maintained in lawn, others are mowed less frequently. This can provide for a greater diversity of plant and animal species (odonates, lepidoptera, other invertebrates and/or grassland birds depending on management regime). All of the upland fields fit into the *Dactylis glomerata* – *Rumex acetosella* Cultivated Herbaceous Alliance.

The global ranks of some of the vegetation types at Fire Island National Seashore have not been clearly defined as data on the extent of these communities is incomplete. However, six associations on Fire Island are regarded to be globally rare, including the maritime holly forest at Sunken Forest, ranked G1 (fewer than six known occurrences). The maritime grassland identified at the William Floyd estate is also rare, with a rank of G2, imperiled throughout its range. The data from this project will help to further refine the rangewide descriptions, extent and the global ranks of all of these vegetation associations.

## VEGETATION CLASSIFICATION

### I. Forest

I.A.4.N.a. Lowland temperate seasonal evergreen forest

I.A.4.N.a.300. ILEX OPACA FOREST ALLIANCE

American Holly Forest Alliance

Ilex opaca / Myrica pensylvanica Forest CEGl006376 G1

**American holly / Northern bayberry Forest**

Maritime Holly Forest

I.A.8.N.c. Lowland temperate seasonal evergreen forest

I.A.8.N.c.300. PINUS THUNBERGII FOREST ALLIANCE

Japanese Black Pine Forest Alliance

Pinus thunbergii Forest CEGl006012 GD

**Japanese Black Pine Forest**

Japanese Black Pine Forest

I.A.8.N.c. Lowland temperate seasonal evergreen forest

I.A.8.N.c.2. JUNIPERUS VIRGINIANA FOREST ALLIANCE

Eastern Red-cedar Forest Alliance

Juniperus virginiana Forest (CEGL006024) G?

**Eastern Red-cedar Forest**

Old-field Red-cedar Forest

I.B.2.N.a. Lowland or submontane cold-deciduous forest

### **I.B.2.N.a.29. QUERCUS ALBA - QUERCUS (FALCATA, STELLATA) FOREST ALLIANCE**

White Oak - (Southern Red Oak, Scarlet Oak) Forest Alliance

**Quercus stellata – Quercus velutina / Myrica pensylvanica / Deschampsia flexuosa Forest CEGl006373 G?**

Post Oak - Black Oak / Northern Bayberry / Wavy Hairgrass Forest

*Maritime Post Oak Forest*

I.B.2.N.a.100. QUERCUS VELUTINA - QUERCUS ALBA - (QUERCUS COCCINEA) FOREST ALLIANCE

Black Oak - White Oak - (Scarlet Oak) Forest Alliance

Quercus coccinea - Quercus velutina / Sassafras albidum / Vaccinium pallidum Forest CEGl006375 G?

Scarlet Oak - Black Oak / Sassafras / Hillside Blueberry Forest

*Coastal Oak - Heath Forest*

I.B.2.N.g. Saturated cold-deciduous forest

I.B.2.N.g.2. ACER RUBRUM - NYSSA SYLVATICA SATURATED FOREST ALLIANCE

Red Maple - Blackgum Saturated Forest Alliance

**Acer rubrum - Nyssa sylvatica / Rhododendron viscosum - Clethra alnifolia Forest CEGl006156 G?**

Red Maple - Blackgum / Swamp Azalea - Coastal Sweet-pepperbush Forest  
*Lower New England Red Maple - Black Gum Swamp*

## II. Woodland

II.A.4.N.a. Rounded-crowned temperate or subpolar needle-leaved evergreen woodland

### II.A.4.N.a.26. PINUS RIGIDA WOODLAND ALLIANCE

Pitch Pine Woodland Alliance

**Pinus rigida / Hudsonia tomentosa Woodland CEGl006117 G2 (98-12-08)**

Pitch Pine / Woolly Beach-heather Woodland

*Pitch Pine Dune Woodland*

## III. Shrubland

III.B.2.N.a. Temperate cold-deciduous shrubland

### III.B.2.N.a.9. MYRICA PENNSYLVANICA - (PRUNUS MARITIMA)

SHRUBLAND ALLIANCE

Northern Bayberry - (Beach Plum) Shrubland Alliance

**Myrica pensylvanica - Rosa rugosa Shrubland CEGl006295 G4**

Northern Bayberry - Rugosa Rose Shrubland

### III.B.2.N.a.300. PRUNUS SEROTINA - AMELANCHIER CANADENSIS -

QUERCUS SPP. SHRUBLAND ALLIANCE

Black Cherry - Canada Serviceberry - Oak species Shrubland Alliance

**Prunus serotina - Sassafras albidum - Amelanchier canadensis / Smilax rotundifolia Shrubland CEGl006145 G2G3 (97-10-22)**

Black Cherry - Sassafras - Canada Serviceberry / Common Greenbrier Shrubland

*Northern Deciduous Maritime Scrub Forest*

### III.B.2.N.a.16. SMILAX SPP. - TOXICODENDRON RADICANS VINE-

SHRUBLAND ALLIANCE

Greenbrier species - Poison-ivy Vine-Shrubland Alliance

**Smilax glauca - Toxicodendron radicans Vine-Shrubland CEGl003886 G?**

Whiteleaf Greenbrier - Poison-ivy Vine-Shrubland

III.B.2.N.e. Seasonally flooded cold-deciduous shrubland

### III.B.2.N.e.7. VACCINIUM FORMOSUM - VACCINIUM FUSCATUM

SEASONALLY FLOODED SHRUBLAND ALLIANCE

Southern Highbush Blueberry - Black Highbush Blueberry Seasonally Flooded Shrubland Alliance

**Vaccinium corymbosum - Rhododendron viscosum - Clethra alnifolia Shrubland CEGl006371 G? (98-04-14)**

Highbush Blueberry - Swamp Azalea - Coastal Sweet-pepperbush Shrubland

III.B.2.N.h. Tidal cold-deciduous shrubland

### III.B.2.N.h.1. BACCHARIS HALIMIFOLIA - IVA FRUTESCENS TIDAL

SHRUBLAND ALLIANCE

Groundsel-tree - Maritime Marsh-elder Tidal Shrubland Alliance

**Baccharis halimifolia - Iva frutescens / Panicum virgatum Shrubland CEGl006063 G5**

Groundsel-tree - Maritime Marsh-elder / Switchgrass Shrubland

#### IV. Dwarf-shrubland

IV.A.1.N.a. Caespitose needle-leaved or microphyllous evergreen dwarf-shrubland

IV.A.1.N.a.4. HUDSONIA TOMENTOSA DWARF-SHRUBLAND ALLIANCE

Woolly Beach-heather Dwarf-shrubland Alliance

**Hudsonia tomentosa - Arctostaphylos uva-ursi Dwarf-shrubland CEGl006143 G2 (98-12-08)**

Woolly Beach-heather - Kinikinnick Dwarf-shrubland

*Northern Beach Heather Dune Shrubland*

IV.A.1.N.g. Saturated needle-leaved or microphyllous evergreen dwarf-shrubland

I

V.A.1.N.g.3. VACCINIUM MACROCARPON SATURATED DWARF-SHRUBLAND ALLIANCE

Large Cranberry Saturated Dwarf-shrubland Alliance

**Vaccinium macrocarpon - Myrica pensylvanica Dwarf-shrubland CEGl006141 G2 (97-10-22)**

Large Cranberry / Northern Bayberry Dwarf-shrubland

*Northern Interdunal Cranberry Swale*

#### V. Herbaceous Vegetation

V.A.5.N.c. Medium-tall sod temperate or subpolar grassland

V.A.5.N.c.2. AMMOPHILA BREVILIGULATA HERBACEOUS ALLIANCE  
American Beachgrass Herbaceous Alliance

**Ammophila breviligulata - Lathyrus japonicus Herbaceous Vegetation CEGl006274 G4?**

American Beachgrass - Beach Pea Herbaceous Vegetation

*Northern Beachgrass Dune*

V.A.5.N.e. Short sod temperate or subpolar grassland

V.A.5.N.e.1. SPARTINA PATENS – (SCIRPUS PUNGENS) HERBACEOUS ALLIANCE

Saltmeadow Cordgrass – (Threesquare) Herbaceous Alliance

**Spartina patens - Schoenoplectus pungens - Solidago sempervirens Herbaceous Vegetation CEGl004097 G2G3**

Saltmeadow Cordgrass - Threesquare - Seaside Goldenrod Herbaceous Vegetation

V.A.5.N.k. Seasonally flooded temperate or subpolar grassland

V.A.5.N.k.29. SPARTINA PATENS SEASONALLY FLOODED HERBACEOUS ALLIANCE

Saltmeadow Cordgrass Seasonally Flooded Herbaceous Alliance

**Spartina patens - Eleocharis parvula Herbaceous Vegetation CEGl006342 G?**

Saltmeadow Cordgrass - Dwarf Spikerush Herbaceous Vegetation

V.A.5.N.n. Tidal temperate or subpolar grassland

V.A.5.N.n.1. SPARTINA ALTERNIFLORA TIDAL HERBACEOUS ALLIANCE

Saltmarsh Cordgrass Tidal Herbaceous Alliance

**Spartina alterniflora / (Ascophyllum nodosum) Acadian/Virginian Zone Herbaceous Vegetation  
CEGL004192 G5**

Saltmarsh Cordgrass / (Yellow Tang) Acadian/Virginian Zone Herbaceous Vegetation

*Spartina Low Salt Marsh*

V.A.5.N.n.2. TYPHA (ANGUSTIFOLIA, DOMINGENSIS) TIDAL HERBACEOUS ALLIANCE

(Narrowleaf Cattail, Southern Cattail) Tidal Herbaceous Alliance

**Typha angustifolia – Hibiscus moscheutos Herbaceous Vegetation CEGL004201 G?**

Narrowleaf Cattail – Eastern Rose-Mallow Herbaceous Vegetation

*Brackish Marsh*

V.A.5.N.n.4. ELEOCHARIS FALLAX - ELEOCHARIS ROSTELLATA TIDAL HERBACEOUS ALLIANCE (A.1474)

Creeping Spikerush - Beaked Spikerush Tidal Herbaceous Alliance

**Eleocharis rostellata – Spartina patens Herbaceous Vegetation CEGL006611 G?**

Beaked spikerush – Saltmeadow Cordgrass Herbaceous Vegetation

V.A.5.N.n.6. PANICUM VIRGATUM TIDAL HERBACEOUS ALLIANCE  
Switchgrass Tidal Herbaceous Alliance

**Panicum virgatum - Carex silicea Herbaceous Vegetation CEGL006150 G?**

Switchgrass - Beach Sedge Herbaceous Vegetation

V.A.5.N.n.7. PHRAGMITES AUSTRALIS TIDAL HERBACEOUS ALLIANCE

Common Reed Tidal Herbaceous Alliance

**Phragmites australis Tidal Herbaceous Vegetation CEGL004187 GW (97-11-22)**

Common Reed Tidal Herbaceous Vegetation

*Reed-grass Marsh*

V.A.5.N.n.11. SPARTINA PATENS - (DISTICHLIS SPICATA) TIDAL HERBACEOUS ALLIANCE

Saltmeadow Cordgrass - (Saltgrass) Tidal Herbaceous Alliance

**Spartina patens - Distichlis spicata - Plantago maritima Herbaceous Vegetation CEGL006006  
G5**

Saltmeadow Cordgrass - Saltgrass - Seaside Plantain Herbaceous Vegetation

*Spartina-High Salt Marsh*

V.A.7.N.g. Medium-tall temperate or subpolar grassland with a sparse cold-deciduous shrub layer

V.A.7.N.g.1. SCHIZACHYRIUM SCOPARIUM SSP. LITTORALE SHRUB HERBACEOUS ALLIANCE

Seaside Little Bluestem Shrub Herbaceous Alliance

**Myrica pensylvanica / Schizachyrium scoparium ssp. littorale - Danthonia spicata Shrub  
Herbaceous Vegetation C EGL006067 G2 (99-12-02)**

Northern Bayberry / Seaside Little Bluestem - Poverty Oatgrass Shrub Herbaceous Vegetation  
*Northern Sandplain Grassland*

V.B.2.N.g. Tidal Temperate Perennial Forb Vegetation

V.V.2.N.g.4. SARCOCORNIA PERENNIS – (DISTICHLIS SPICATA,  
SALICORNIA SPP.) TIDAL HERBACEOUS ALLIANCE

Woody Glasswort – (Saltgrass, Saltwort Species) Tidal Herbaceous Alliance

**Salicornia virginica – Sueda linearis Herbaceous Vegetation C EGL006032 G5**

Samphire – Sea-Blight Vegetation

*Salt Panne*

VII. Sparse Vegetation

VII.C.2.N.a. Sand flats

VII.C.2.N.a.2. CAKILE EDENTULA SPARSE VEGETATION ALLIANCE

Sea-rocket Sparse Vegetation Alliance

**Cakile edentula ssp. edentula - Chamaesyce polygonifolia Sparse Vegetation C EGL004400  
G4G5**

Sea-rocket - Northern Seaside Spurge Sparse Vegetation

*North Atlantic Upper Ocean Beach*